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EXAMINER

NGUYEN, LAM S

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2853

DATE MAILED: 01/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

1. Claims 3, 24, 27, 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Smith et al. (US 4791435).

Smith et al. discloses a printhead temperature control system, comprising:

Referring to claims 24, 27, 31:

a printhead assembly having a plurality of ejection elements (*column 2, lines 5-12: A corresponding element that causes ink firing through a nozzle*);

a temperature sensor configured to generate a measured temperature of the printhead assembly (*column 1, lines 57-66 and column 4, lines 30-41*);

a memory device configured to store a thermal response model of the printhead assembly and an ejection history of the ejection elements (*column 1, line 53 to column 2, line 2: A corresponding memory stores thermal models of the pens or printheads and the profiles of use of the nozzles*);

a controller (*FIG. 2A, element 2*) configured to estimate an actual temperature of the printhead assembly on the measured/current operating temperature of the printhead assembly, the thermal response model of the printhead assembly, and the ejection history (current operating parameters) of the ejection elements (*column 4, lines 38-40: Such temperature*

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sensors are used to provide the input needed to estimate the printhead temperature. Column 1, lines 64-67: Thermal models of the pens or printheads are provided and these are used in conjunction with printhead temperature sensors to provide the information useful in controlling the printhead temperature. Column 1, line 68 to column 2, line 2: Profiles of the use of the nozzles compared with a thermal model provide information useful in controlling head temperature. Column 1, lines 15-19: The printhead temperature varies with the use profile of the printhead),

wherein the ejection history of the ejection elements identifies whether the ejection element have been fired and whether the ejection elements have not been fired (*column 2, lines 20-37*), and wherein the thermal response model of the printhead assembly includes a first set of parameters when the ejection elements have been fired and a second set of parameters when the ejection elements have not fired (*column 2, lines 1-25: Two set parameters, each regards to low temperature mode if the ejection elements have not been fired and high temperature mode if the ejection elements have been fired, may include parameters of low energy pulses for warming purpose or parameters of the operable range of a particular nozzle*).

Referring to claim 3: wherein the controller is located on at least one of the printhead or externally on a printer (*FIG. 2A*).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 4-9, 10-11, 21-22, 25, 28, 30, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Smith et al. (US 4791435) in view of Prakash et al. (US 6302507).

Smith et al. discloses the claimed invention as discussed above and calculating an adjusted pulse width based on the current operating parameters of the printhead and the estimated actual operating temperature of the printhead (*column 2, lines 54-68 and column 4, lines 45-50*), but does not disclose wherein the calculation of the adjusted pulse width is based on pulse width calibration data or based on an optimal operating temperature (**Referring to claims 25, 28, 32**), wherein the pulse width calibration data is in the form of an equation or in a look-up table (**Referring to claims 10-11, 21-22**), wherein the controller reads the pulse width and pulse width calibration data from a memory located on the printhead assembly or a printer associated with the printhead assembly (**Referring to claims 4-5**), wherein the temperature sensor is an analog or digital temperature sensor and further including an analog to digital converter for generating a digital format from the analog temperature sensor (**Referring to claims 6-8**), wherein the temperature sensor includes multiple temperate sensors distributed around the printhead assembly (**Referring to claim 9**).

Prakash et al. discloses a temperature control system for an ink jet printhead assembly having ink ejection elements energizable by an electrical pulse having an amplitude and pulse width (*Abstract*), wherein the temperature control system includes a controller that calculates an adjusted pulse width based on pulse width calibration data (*Abstract*) or based on an optimal operating temperature (*column 13, lines 24-32*), wherein the pulse width calibration data is in the form of an equation or in a look-up table (*claims 10-11*), wherein the controller reads the pulse width and pulse width calibration data from a memory located on the printhead assembly or a

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printer associated with the printhead assembly (*claims 4-5*), wherein the temperature sensor is an analog or digital temperature sensor and further including an analog to digital converter for generating a digital format from the analog temperature sensor (*claims 7-8*), wherein the temperature sensor includes multiple temperate sensors distributed around the printhead assembly (*claim 9*).

Therefore, it would have been obvious for one having ordinary skill in the art at the time invention was made to modify the calculation of energy of driving pulse disclosed by Smith et al. also based on pulse width calibration data as disclosed by Prakash et al. The motivation for doing so is to ensure adequate firing energy levels for full drop volume firing in “blackout conditions” as taught by Prakash et al. (*column 11, lines 25-29*).

Response to Arguments

Applicant's arguments filed 12/13/2005 have been fully considered but they are not persuasive.

The applicant argued that the Smith et al. patent did not disclose estimating an actual temperature of the printhead assembly as claimed, but rather merely provided temperature compensation, controlled for different printhead temperature, and only disclosed temperature sensors for use in estimating the printhead temperature. The examiner responses as follows:

First of all, Smith et al. teaches that by using the output of the thermistor (measured/current temperature), a close estimate - not the actual - of the printhead temperature is achieved (*column 1, lines 62-64*). Consequence, Smith et al. suggests using thermal models (thermal response) in conjunction with the output of the thermistor and comparing the thermal model (thermal response) with the nozzle profile (ejection history) to provide a more accuracy

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information (close to actual temperature) useful in controlling the printhead temperature (column 1, line 64 to column 2, line 3). Therefore, Smith et al.'s controller takes into account the current temperature measured by the thermistor, the thermal models, and the nozzle profile (history) to provide an useful information for controlling printhead temperature by correspondingly adjusting/optimizing firing/warming pulse width.

Moreover, the claimed actual temperature is used as an information to allow optimized energy deliver to ejection elements (*specification, paragraph [0049]*). In addition, the claim language does not define how the claimed controller estimates the actual temperature based on the measured temperature, the thermal response, and the ejection history. Smith et al.'s controller, as a result, anticipates the claimed controller because both take into account the same input information and provide the outputs of the same function.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to LAM S. NGUYEN whose telephone number is (571)272-2151. The examiner can normally be reached on 7:00AM - 3:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, STEPHEN D. MEIER can be reached on (571)272-2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

LN
01/23/2006



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PRIMARY EXAMINER